[p. 23a]

241 when maize begins to do poorly in a field, with small stalks and poor ears, barley is often planted for 1 year. This "warms up" the soil and good corn crops are secured for a few years.

243 Maize lands are plowed twice, the first time in late summer or fall, the second in late winter, the furrows of the second plowing being made at right angles to those of the first. Planting takes place in the spring after danger of frost is past; on the plain this is as early as March, but at higher elevations it may be later.

Three men and two yokes of oxen are used in planting. One yoke of oxen draws a plow which opens a furrow. A man follows this furrow, dropping seed each step and pressing it down with his foot. Two grains are dropped unless worms are bad, when three or four may [804] be planted. Maize rows are about 1 *vara* (32 inches) apart. The second yoke of oxen draws a plow which makes a furrow between the planted rows, covering the seed to a depth of about 4 inches. To aid in covering the corn, the second plow has a wooden bow fastened horizontally below the beam behind the plow point. No digging stick is ever used except to replant fields damaged by worms, and all work [462] is done by men. There is no exchange of labor [476] or lending of tools or animals, even among relatives.

Several types of maize are grown. Trimásion is white with a somewhat larger grain and is sown in the "plains." It has more and larger stalks and ears. Tulukénio is yellow and has small grains. It is sown in the mountains about 8 to 15 days later, but matures at the same time as Trimásion. The ears are short, ordinarily about 4 inches in length, and the stalks are smaller. The fact that Tulukénio is always sown on poorer and colder lands probably accounts for most of the differences, although it is claimed that the differences persist when the two types are planted in the same fields. However, probably because of the methods of seed selection and the isolation of mountain fields, some regressive or primitive types occur in Tulukénio which may have genetic significance. Not enough Trimásion types have been studied to define the differences.

In the garden plots a black or dark-blue maize (ɾirá7ki) is planted. It appears to have some significant differences from Tulukénio,

243 although belonging to the same race (see Appendix 3). It is believed in Cherán that blue maize will not grow in the fields, although an almost identical genetic type is grown in the fields in Sevina and Nahuatzen. The stalks are taller and more slender and the ears are larger and longer than those of other types. Although it may be planted as early as Trimásion, the maturation time is faster and some people plant black maize late in order to have a single harvest time. In no case is black corn planted before Easter Saturday. However, much of
[262] the black maize is eaten in the milk stage as roasting ears. The stalks are also sweeter, apparently, and non-bearing stalks are cut and
[263] chewed to extract the sweet sap.

All Cherán farmers preserve a red color
243 variant of the Trimásion and Tulukénio types.
824 Red ears are called čóču and are considered a different variety, but genetically the type apparently is only a color variant. A few red ears are always planted in each field. The reasons are discussed below. Red maize is said to be sweeter and is used for two kinds of cookies, an S-shaped cookie called čústika and a coiled shape called tokére čústika.

No effort is made to select seed at harvest.
243 All the maize is stored together, but as corn is taken from storage for use, the farmer's wife systematically lays aside red ears and the largest and best-filled-out ears, always taking inferior ears for food or sale. In this way, when planting time comes, the best ears remain. These are sorted and a further selection made. Grains from the butt and tip are discarded.

Maize seed selection is always done when the moon is crescent. Neither selection nor shelling
[821] is done after the full moon. This rule applies to no other seeds. Each family keeps its own seed (of all other plants as well as maize) and obtains seed from others only if its own is very bad.

Maize is subject to many plagues and animal enemies. Pocket gophers do great damage to maize (and also to wheat). Before planting, and usually before plowing, gunpowder is exploded in the runways of the animals, which is said to kill many. No effort is made to trap or kill survivors, however, even though they may be damaging growing crops severely.

243 While crops are small, posts are placed in the fields to provide perching places for hawks.

Worms may damage small plants to the point that reseeding is necessary, especially if there are long periods of cloudy weather without rain. Worms also damage about 35 percent of the ears. Deer damage crops badly only in isolated mountain fields. Badgers in some places are serious pests. The only remedy is to attempt to shoot the animals. Birds do little damage. Some maize is attacked by a fungus. [262] The fungus is eaten, but it is not sold or prized as a delicacy as is the case in some parts of Mexico.

243 672 685 Trespass by domestic animals and theft must be guarded against. Sometimes isolated fields are completely stripped if not watched. Stray animals caught damaging corn are taken to the *municipio* and held in jail until the owner pays for the damage.

243 [132] Unseasonal frost often damages corn, particularly late plantings and in fields at high altitudes. In 1940, frost, heavy enough to damage some fields, occurred on September 29.

When maize is about 1 foot high it is cultivated (*"escarda"* also *"trozando"*) by running the plow between the rows, throwing dirt toward the plants. This is done a second time when the plants are about 18 inches tall. If it is delayed too long, the roots may be cut, the maize leaves will yellow at the tip, and no ears will form.

When the maize is in tassel, after the rainy season is well underway, the fields are weeded *"chaponeado."* [112] This is done by hand with a short machete, called *"os,"* with a sharp curve at the point. Also, earth is piled around such plants as were not sufficiently covered by the cultivation. If the weeds are bad, a second weeding is sometimes done, but not often. If weeding is omitted, weeds climb high up the stalks and the crop suffers considerably. The weeds removed are piled up beside the fields and are not used for feed or fertilizer.

243 221 674 As soon as grain is well formed on the ears, some maize is used for food, usually roasted. At this time, also, guards must be set in the fields, not only to keep animals out, but to prevent theft. Whole families may move to temporary field shelters at this time and remain until the harvest. In the "plains," usually

243 only a few watchers are necessary. A pine
221 tree some 20 feet high is trimmed and set
674 firmly in the ground. The watchers climb this and spend hours standing uncomfortably in the crotches left by trimming the branches. Often several families may cooperate in watching, or several landowners may hire watchers, called *veladores*.

243 When the ears are well formed, but while
246 stalks and leaves are still green, fodder (*"rastrojo"*) is cut. All stalks without ears, and the ear-bearing stalks above the ears, are cut, dried, carried to the house, and stored in sheds. This forms the principal fodder for animals. The stalks remaining in the field are not cut after the harvest, but animals are allowed to graze the harvested fields.

243 The main work of harvesting is done by men.
[462] Women bring food to the men, and they also glean, assisted by children. At harvest each man takes two rows at a time. The ears are picked, husked, and thrown in a round cane-
[482] splint burden basket (ǎundis) carried on the
[285] back with the aid of a tumpline. Ears which miss the basket belong to the gleaners, who also take the nubbins. When the basket is filled, the corn is piled at convenient spots.

243 The harvest is the busiest time of year.
464 Except for a few specialists, the sick, and the
466 infirm, everyone works, either on his own harvest or as a laborer for someone else. Labor also comes from other towns. Wages are 40 to 50 centavos a day, plus the right to glean. Women and children follow the men of their own household and close supervision is necessary in order to prevent too many ears from being dropped or overlooked. The workday is about 7 hours. The larger landowners have tried unsuccessfully to eliminate gleaning by raising wages to 1 peso a day. Men refused to work without gleaning rights, despite the opinion of most objective observers that the maize secured from gleaning had less value than the additional wages. The landowners would have saved through eliminating supervisors. When the harvest is over, some farmers treat all their help to a few drinks of *aguardiente* (čaránda).

243 Most of the harvest is carried to town and
492 the storehouses on burros. Nets are used to
[493] hold the ears. Sometimes other animals are used, and for some fields employment of two-wheeled oxcarts is possible, although they are rarely used.

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243 492 [427] wheeled oxcarts is possible, although they are rarely used. Burros usually have to be rented or borrowed; in the latter case, a gift of maize or money equal to the rent is usually made. Fifty centavos a day is the usual pay for burros, which adds considerably to the expense of bringing in the harvest from distant fields. Often pay is in maize and is subject to some bargaining.

243 632 The time of the harvest varies in different places. If the "plain" west of town is planted, the main harvest is in November, but if the "plain" southeast of town is planted, the harvest is in December. In either case, the town council, in consultation with the principal landowners, sets the dates for harvests. Where lands adjoin those of neighboring towns, usually both towns begin the same day. Eight days after the date set, anyone may turn animals into the fields. Persons who have not completed harvesting or carrying in their harvest may have difficulty protecting it from animals.

243 527 692 273 As the harvest is a time of joint work, even though not communal in character, it also is a rather festive and social occasion. Moreover, many workmen have more money than at any other time. To protect them from temptations, keep them sober while working, and avoid distractions, the sale of fruit or liquor is prohibited outside the edge of town. Actually, the "edge of town" becomes somewhat elastic, and vendors may set up stands as much as half a kilometer from town.

243 In 1940 the following schedule of harvests was posted:

December 5. Huanaschucun (sloping lands at the foot of the Cerro de la Virgen, northwest of town).
December 9. Eastern part of the "plain" of Sharicho and Rincon de Paso.
December 16. Western part of Sharicho.
December 19. Plain of Arantepacua.

No rules were posted for smaller isolated areas and fields which were fenced. The parts of Sharicho and other areas close to the Nahuatzen boundary were harvested beginning November 26 in order to prevent conflicts over animals crossing the boundary.

251 243 White maize and yellow maize are stored unshelled in the lofts of "*trojes*." Little effort is taken to protect maize from rats and squirrels

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243 and none at all to stop attacks of weevils or beetles. 251 There are no mechanical corn shellers in Cherán, and bulk sales of unshelled maize are often made. Small amounts may be shelled for sale to storekeepers if there is need of a few cents in cash. One common method of shelling corn is to bind corncobs tightly with wire or cord to make a bundle about 12 inches in diameter. Maize ears are laid on the floor and rolled with this crude implement.

Black maize usually is not completely husked. Instead, pairs of ears are tied together and hung over poles in the house. The best ears are often hung on a pole on the veranda. Good field ears may also be hung in the house. [252] Most black corn is consumed as roasting ears. [796] Otherwise it is usually saved to make tamales in Easter week.

Discussion of land values, maize yields, and labor costs is deferred to the section on economics.

## WHEAT

243 Wheat lands may be fertilized by hiring sheep to bed at night on wheat fields. [231] Lands are plowed once before planting, and the seed is then sown broadcast. The land is then plowed lightly a second time, the furrows being at right angles to the first. Thorny brush, such as wild crab apple, is weighted and dragged across the furrows to break up large clods and to complete covering of the seed.

Some persons say only one kind of wheat is grown at Cherán, a type planted between September and November and maturing during the dry season. However, both bearded and beardless varieties were observed. Moreover, a few families have a so-called winter wheat [821] ("winter" in Cherán is the rainy season, technically our summer) which is planted before the rainy season and matures in August or September. The more commonly grown wheat, it is said, would not survive so much water. Some other Tarascan towns near Tangancicuaro are reported to grow a reddish-colored wheat.

The dry-season wheat is short-stalked and often grows very sparsely. Moreover, most wheat is grown on inferior sloping lands or lands on which corn does not do well. Rains often appear to be inadequate to produce a

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243 good crop, although complete failure is rare. A little wheat is grown in town lots, where it seems to do better than in fields.

[462] Wheat is harvested by hand with a sickle. Men do most of the work, but women and children help sometimes. The plants are cut as close to the ground as possible, tied in sheaves, and transported to the houses. One, and in [407] 1940 two, small threshing machine is used in Cherán, but the bulk of the wheat is threshed by hand with flails. The flail used is a slender pole about 8 feet long. To this are fastened two or three heavy iron wires some 10 to 12 feet long. Threshing is done on any hard clean-swept ground when the weather is dry. One stone threshing floor exists at the end of Zaragoza Street. The owner is usually given a liter or so of wheat for its use, although it is built on public property. The straw is carefully saved, whether threshing is done by hand or by machine. Both men and women winnow [462] the wheat on windy days (pl. 3, center). The grain is stored in sacks.

252 Some wheat is consumed locally. It is ground on the metate and made into bread or 439 atole. The bulk of the wheat is sold, however, to four mills at Purépero, Carapan, Tarataro, Jacona, or as far away as Morelia (since the highway has been built). Wheat is, indeed, probably the major cash export crop of Cherán. Prices and costs are discussed later.

## MINOR CROPS

*Barley.*—Some barley is sown in June and harvested about October. Techniques of planting and harvesting are similar to those for wheat. Barley is fed to animals or sold outside the town. It is stored in sacks. Most barley is planted to restore failing cornlands, and the quantity is not important nor is it regarded as an intrinsically valuable crop.

*Oats.*—Although the growing of oats is reported, no farmer was found who had planted the grain. The quantity must be unimportant.

*Beans.*—The soil of Cherán is said not to be 244 good for beans; possibly the climate is also unsatisfactory. Whatever the reason, Cherán grows few beans and many are imported from the Lake Pátzcuaro region.

The principal bean grown is a small pinkish type called *criolla*. White, orange-yellow,

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426 In addition to the above-described types of loans, there are also loans at interest for which normally no security is offered. These loans are usually made by persons within the village and rarely exceed $100 in amount. Interest is normally 10 percent per annum. In some cases it is stipulated that the debt is to be canceled upon the death of the debtor. In other instances the debt becomes a charge against [428] the estate of the debtor. If the possessions of the debtor at death are insufficient to pay the debt, it is not transmitted to his sons. However, according to Pedro Chávez, the sons probably would make every effort to pay such a debt because of the strongly held belief that a person [775] dying with debts cannot rest in peace until the debts are paid.

All transactions involving loans are in writing, although they are not registered at the *municipio*.

## COSTS OF PRODUCTION AND INCOME

433 Some further insight into production prob-
434 lems may be gained by detailed studies of
128 specific activities. These data throw light upon the relative profitability of such activities and also provide information on income. Not all activities are covered in the ensuing discussion, nor are the data equally reliable in each category. Such activities as witchcraft or midwifery are not included; the labor factor in beekeeping or fruit growing is impossible to ascertain. An activity followed by only a few individuals merits less attention than one followed by many.

Not only is the treatment of topics uneven, but the income data are subject to misinterpretation. It must be emphasized that virtually no one in Cherán, except a few "rich" farmers or storekeepers, has only one occupation. Consequently, any effort to establish annual income on the basis of figures in this section would be grosly misleading. Finally, it should be noted that not all the activities discussed below are productive. Because of the problem of income, I have considered a number of "service" occupations in this section.

### AGRICULTURE

243 *Maize.*—Data on farm production were diffi-
433 cult to obtain. On no other subject is there so
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[p.64b]


124 much secrecy or misleading information given.
243 Three sources of information were used: (1)
433 Data from farmers about their own activities. All this information is suspect, even after eliminating obviously false answers. (2) Data from Agustín Rangel, who was interested in establishing himself as a farmer and probably was a good and relatively unbiased observer. (3) Observation of farm practices and participation in harvests on roughly measured fields. Actual measurement of fields was undesirable and would have caused trouble.

243 In table 1 are given the various data collected
433 on farm yields. The average of figures given by farmers is about the top figure given by Rangel for average land in a poor year. It is slightly above the figure for the yield of average land in a poor year as secured by participation in the harvest. The cross checks suggest the figures given by farmers are on the whole plausible although probably low. The figures given by any individual farmer, however, may be quite incorrect. This should be borne in mind throughout the discussion.

TABLE 1.—*Estimates of maize yields in Cherán*

ESTIMATE BY OWNERS

| Number of hectares cultivated | Yield (per hectare) in— | | Value of crop |
|---|---|---|---|
| | *Cargas* | *Fanegas* | |
| 2½ | 40 | 30 | ..... |
| 10½ | 180 | 135 | ..... |
| ½ | 7 | 5¼ | ..... |
| ½ | 20 | 15 | $90–110 |
| ½ | 10 | 7½ | 60– 70 |
| ½ | 5 | 3¾ | 25 |
| ½ | 10 | 7½ | 65 |
| ½ (early-frost area) | 3 | 2¼ | 15 |
| 4 | 90 | 70 | 350–400 |
| 1 | 10 | 7½ | 40 |
| 1½ | 10 | 7½ | 40 |
| ½ | 12 | 9 | 55 |
| ½ | 12 | 9 | 55 |
| Average | ... | 14⅝ | ..... |

ESTIMATE BY AGUSTIN RANGEL

| Type of land and year | Average yield per hectare | |
|---|---|---|
| | *Cargas* | *Fanegas* |
| Best land: | | |
| Average year | 40 | 30 |
| Bad year | 15–25 | 11¼–18¾ |
| Average land: | | |
| Average year | 30 | 22½ |
| Bad year | 5–20 | 3¾–15 |
| Poor land | ..... | 1½ |

[1] An exceptionally rich "joya," a fertile depression in the mountains fertilized by drainage from surrounding slopes.

[2] This is a stupendous yield, if true, but the land is said to be exceptionally located, with fertilization from adjoining slopes.

[3] Data in this line are typical of information from owners. One area given as ½ hectare yields a crop to be expected of a full hectare; on inspection, it proved to be nearly 3 hectares.

[124]

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TABLE 1.—*Estimates of maize yields in Cherán*—Continued

ESTIMATE BASED ON OBSERVATIONS AT HARVEST

| Type of land | Yield in *fanegas* per hectare | Remarks |
|---|---|---|
| Poor to average land | 3 | Maize badly damaged by early frost. |
| Average land | 12 | Maize slightly damaged by frost. |

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433
461

In addition to securing data on yield, i.e., income, for maize, an effort was made to secure data on production costs. General statements as to the amount of time put in on farm work proved worthless. Usually the time given would scarcely provide for a single weeding. The best figures were secured by breaking down the different steps and getting experienced farmers to estimate the time necessary for cultivating 1 hectare. A summary of such data gives the following:

| | Days |
|---|---|
| **Labor of owner:** | |
| First plowing | 10 |
| Second plowing (at right angles) | 10 |
| Sowing | 3 |
| First cultivation (with plow) | 4 |
| Second cultivation (with plow) | 3 |
| First weeding (with sickle or machete) | 3 |
| Second weeding (often omitted) | .3 |
| Harvest | 1 |
| Carrying maize to house (estimated average) | 5 |
| Total | 42 |
| **Hired labor:** | |
| Sowing (2 peons) | 3 |
| Harvesting (3 peons) | 1 |

| | |
|---|---|
| **Costs:** | |
| Owner's labor (42 days valued at $0.45 a day outside of planting and harvesting time) | $18.90 |
| 2 peons for 3 days | 3.00 |
| 3 peons for 1 day | 1.50 |
| Total | $23.40 |

[465]

On the assumption that a man will own sufficient land to require hired labor, the summary given above includes 9 man days of hired labor at a cost of $4.50 or a total of 51 man days of labor worth $23.40. To this must be added $30 for hire of an ox team if one is not owned, probably $1 in taxes, and $2.50 for the value of the seed corn (one-half *fanega*), or a total of $56.90. If this is about an average piece of land, the yield will be 15 to 20 *fanegas* of shelled

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243 433 461 maize, for which the farmer should receive from $75 to $120, or a profit of $22.10 to $63.10. From this, in theory, should be deducted interest on the investment in land and equipment as well as a depreciation allowance on the equipment. If the land is worth $90 (above average), it would seem fair to allow at least $11 for these charges, which still leaves a profit of $11.10 to $52.10.[23]

As will be seen in later discussions, this makes maize farming on average or better land probably one of the most worth-while businesses in Cherán. Obviously there are elements of risk. Farmers on poor land, moreover, probably get no profits at all on this basis, for labor and expenses would be reduced very little relative to reductions in yield. The second weeding and part of the harvesting expenses might be eliminated. But if the yield is as low as 1½ *fanegas* (as has been reported) a man would get virtually no return at all. If he had his own ox team and did all his own work (with the help of sons or his wife), he might get $4 to $5 worth of maize for his effort after deducting the costs of seed and taxes. From the standpoint of our economy, there is obviously a very considerable net loss.

To view the agricultural situation in Cherán only from the standpoint of our economy, however, would be grossly misleading, for to do so does not take into account numerous cultural factors. The Cherán point of view does not reckon agricultural activity in terms of interest, profits, and wages, but in terms of maize in the storage house. I have already mentioned that harvest workers refused an increase in wages from 50 centavos to $1 if the right to glean were rescinded. Most observers agree that the amount of maize obtained from gleaning in a day is less than can be bought for 50 centavos. At $1 the workman could therefore buy more corn than his wife could obtain by gleaning. The large farmers would get a more thorough harvest and would not have to employ supervisors. On a bookkeeping basis, everyone would benefit. But the harvest hand would not have a load of maize, small though it might be, to carry home from a day's work; he would have only an inedible silver peso in his pocket.

[23] Charges for animals to carry the crop and for watchmen and storage facilities are not included.

243 433 461 In the case of the farmer who slaves at producing a scanty crop on submarginal land, similar considerations are important. The farmer does not count interest and wages; the measure of his effort is maize in the storehouse to feed his wife and children. It is useless to point out that he could earn enough wages for the same amount of labor to buy two or three times as much maize as he can produce, for he will not be convinced.

243 433 153 Even in the case of the average or somewhat better than average case cited in detail, the calculations made on the basis of our economic viewpoints are relatively valueless. Profits, interest, depreciation, and wages do not enter into the farmer's calculation (with the exception of a few large farmers). Rather would the typical farmer calculate that the maize obtained in this case would, with a family of not over five, feed the family for a year by exercising due care. If he had two pieces, each of a hectare or a little more in area, in two locations to plant alternate years, he could count with some security on feeding his family. If, in addition, he had a bit of wheatland, he would probably sell enough wheat to meet the essential cash outlays for his family. Any income from livestock, work in the forest, or as a hired laborer would then go into essentially luxury spending or savings to buy more land. It is wheat that is a money crop, it should be noted, and not maize. Only the wealthy sell maize, and only the poor or improvident buy it.

184 433 243 In case maize is raised for sale on any scale, however, the farmer encounters new marketing problems. The local market prefers yellow maize, as does Mestizo Purépero. Uruapan, on the other hand, prefers white maize, while the Lake Pátzcuaro region desires pink, red, or mixed color maize. As prices may vary in the different major markets, the farmer's income may be affected by the color of maize he has grown.

243 433 427 From the statements given above it should not be concluded that the idea of a return for land ownership, i.e., a return upon the capital investment, is lacking in Cherán. It exists, but it is colored by the local attitudes. Thus, farmers with more land than they can conveniently cultivate, storekeepers owning land, and various others may rent land on a share-

243 433 427 cropping basis. The number of sharecroppers in Cherán is unknown, but probably is considerable. Small landowners often farm additional lands on this basis, and some fairly prosperous families are sharecroppers.

The rental paid by sharecroppers is usually one-half the crop. In the case of our average hectare this would mean the owner received 7½ to 10 *fanegas* of maize worth from $37.50 to $60.00. This might well be equal to more than a 50 percent return on the investment in land. As even the most exorbitant interest rates on cash loans from banks would not exceed 15 percent, it would appear to be a very good business to borrow money to buy land for rental on a sharecropping basis. Yet such a procedure, so far as could be discovered, is seldom if ever followed. Moreover, persons with money will lend on land as a security, receiving only interest, instead of buying land which would appear to offer a relatively larger return. (But short-term loans are at a much higher rate of interest. See p. 63.)

231 243 427 434 A number of factors still have not been treated in the foregoing discussion. It should be observed that the hypothetical farmer could still further decrease his cash outlay if he owned his own ox team. Such a team would be worth from $100 to $120, depending on size. Ownership of a team would save about $30 a year in rental in cultivating a hectare. In addition, there might be opportunities to rent the team at $1 a day for perhaps 30 days to work on maize lands and perhaps for another 30 days during the wheat season. As there is less demand in the latter time, the rental probably would be only 75 centavos a day. The returns from rentals, however, would possibly be $52.50 a year. If the saving of $30 for rentals on the farmer's own land were included the investment in an ox team obviously would be a very good one.

Ownership of livestock, however, involves the problem of feed. Mostly the feed is secured by cutting the *rastrojo* or corn fodder. Wheat straw is also fed. Part of the year animals may be grazed on the common pastures. Rarely, however, is enough feed produced, and in a bad year there is always danger of losing animals during the latter part of the dry season. Ownership of oxen also increases the

231 amount of labor. Not only must *rastrojo* be
243 cut, but the animals must be visited every 2 or
427 3 days while in pasture.
434 The question may be raised why horses or mules have not replaced oxen to any extent. Although horses or mules will do at least twice the amount of work in a day, owing to their greater speed and ability to work longer hours, they do not thrive on the corn fodder, wheat straw, and scanty pasturage. Grain feed is also necessary, at least during the working season. In general, horses and mules are more delicate and require more attention, greater skill, and better shelter. Finally, their initial cost is greater and they cannot be slaughtered for meat, as are oxen, when they have outlived their usefulness as draft animals.

*Wheat.*—Although wheat is the primary cash
243 crop of Cherán, it is seldom grown on lands
433 which will produce good maize. Wheat is often
311 grown on inferior land, often on slopes, but never on really bad lands. Farmers using good land for wheat usually have a surplus of maize lands.

The cultivation of wheat takes a little less
243 labor than does that of maize. Plowing is the
461 same or perhaps a little less (the second plow-
433 ing being shallower). Broadcasting of seed and harrowing equate with maize planting, but it is a one-man job and requires no oxen if the farmer owns a burro. The primitive harvesting with a sickle would seem to call for more labor, but estimates were fairly low. A summary of estimates for cultivating a hectare follows:

| Labor: | Days |
|---|---|
| First plowing | 10 |
| Second plowing | 10 |
| Sowing and harrowing | 2 (or less) |
| Harvesting | 4½ |
| Total labor | 26½ |

| Costs: | |
|---|---|
| Labor (26½ days at $0.45, value) | $11.92 |
| Rent of oxen (20 days at $0.75, value) | 15.00 |
| Taxes | 1.00 |
| Seed | 1.00 |
| Total production costs | $28.92 |
| Interest on capital investment | 11.00 |
| Total cost of cultivation | $39.92 |

243 433 The best wheatland produces about 2 *cargas* of wheat per hectare; lands producing less than 1½ cargas are seldom cultivated. The wheat must then be threshed before sale, and this will cost $2.50 a *carga* in the mill and about the same if threshed by hand. The wheat will sell at from $22 to $30 a *carga*, depending upon the market ($26 in 1941).

243 434 The return in cash, then, is between $33 (1½ *cargas* at $22) and $60 (2 *cargas* at $30). The net profit in terms of our calculations would vary between minus $10.67 and plus $15.08. This figure does not count the labor of carrying the wheat to the house and thence to the mill, or winnowing; neither does it include the value of the straw (used as feed). Again, however, the Cherán farmer who received $33 for his year's work on a *hectare* would count himself relatively fortunate.

The return from wheat is less than the potential return from maize cultivation on average land. In general, however, wheat is usually grown on lands giving a poor maize yield. Moreover, the demand for wheat appears to be 243 more stable, and in days when transport was 434 all on pack animals the greater value of wheat 438 per volume and weight made it much more [491] attractive as an export crop. The opening of the highway may alter the situation, as it makes bulk transportation of maize feasible. On the other hand, the highway has opened up new markets for wheat. Trucks from the large [439] flour mill at Morelia now come to buy wheat in Cherán and even penetrate to mountain villages such as Pichataro. Consequently, a much wider market is available than the regional mills that could be reached in a day or a little more with burros. Of course, similar expansion of markets is available to maize growers and producers of other products. It is still too early to predict the effects of improved communications on the agriculture of Cherán, but some additional considerations are discussed in connection with trade.

243 256 434 438 Another way of disposing of wheat is to sell it at a flour mill in a Mestizo town or convert the wheat into flour and sell the flour. The price paid at flour mills is about $4 a *carga* above the Cherán price. Mills charge an 18 percent discount if the farmer chooses to have his wheat milled. This covers waste, bad

1:Beals E-5 (1940-1941)1946 NU34 Tarasco NU34


256 wheat, and the milling charge. A *carga* pro-
243 duces about 14 *arrobas*, or about 250 pounds
434 of flour, of which the mill takes 2½ *arrobas*, or
438 62½ pounds. The farmer receives 187½ pounds of flour. Either of these procedures involves the labor of transporting wheat to the mill and, in case the farmer has no burros, the rent of pack animals or trucking charges. Mills are at Jacona (regarded as the best), Purépero, Tanátaro, and Carapan.

Yet another way of disposing of wheat is to grind it at home or in a *nixtamal* mill and bake bread for sale in the market towns and at fiestas. Only relatively small quantities are used in this way.

245 One agricultural activity for which few data
438 were obtained is fruit growing. No informa-
434 tion was secured on yields of trees or on labor. The main labor cost is harvesting, usually done by the family at a time when there is little other agricultural activity. Fruit may be carried to markets, or it may be sold to traders.

434 Another view of farming activity may be
24/ gained by examining the income of individual
511 farmers. These data are probably somewhat unreliable, for, as previously indicated, there is a tendency to minimize wealth and income. Table 2 summarizes the available information.

Case 1 is a school teacher with a small family who rents his land. Probably his share in good years supplies most of his family requirements of maize. Case 2 is a storekeeper who also rents his land. In years when his land lies fallow, he must have to buy a little

243 *Threshing machine:*
407 *Equipment:*
433 Woodburning steam-driven threshing machine. Cost unknown, but probably several thousand pesos.
434

| | |
|---|---|
| Charges for wheat threshing (a *carga*) | $2.50 |
| Capacity daily | 12 *cargas* |
| Income daily | $30.00 |

| | |
|---|---|
| Operating expenses (daily): | |
| Wood | $2.00 |
| Hired labor | 2.00 |
| Water carrier | 1.00 |
| Total | $5.00 |

| | |
|---|---|
| Operating season (June 20 to Oct. 25, period worked in 1940 estimated): | *Days* |
| June | 8 |
| July | 25 |
| August | 25 |
| September | 20 |
| October | 15 |
| Total | 93 |

| | |
|---|---|
| Total business (1,116 *cargas*, estimated, at $2.50 a *carga*) | $2,790 |
| Net profit annually before deducting repairs, wages for owner, interest and depreciation, approximately | $2,365 |

*Comment:* Probably the threshing machine has the largest peso volume of business of any enterprise in Cherán, although one of the *nixtamal* mills probably is a close second. The threshing machine also represents the greatest capital investment except for some individual investments in real estate. High repair costs probably reduce the true net profit considerably, while depreciation in this case cannot be ignored. Add to this the time and skill required of the owner, and it is probable that this is not the most profitable enterprise in town even though it be the largest. Certainly, other families of farmers or combination farmers and storekeepers show more outward signs of prosperity.

402 *Nixtamal mills:*

| | |
|---|---|
| Cost of equipment | $300.00–$1200.00 |
| Costs daily: | |
| Gasoline and oil for gas engines | 2.00 |
| Charcoal for producer gas equipped engines | 1.20 |
| Labor, 1 man | .80–1.00 |
| Gross income at 1 centavo per kilo of maize ground (daily) | 13.00–15.00 |
| Net income (daily) | 10.00–12.00 |

*Comment:* Mills work only half time; i.e., by agreement only half the mills operate any one day, so net income should be halved. Even so, this gives a sizable income, but probably the life of the equipment is short. Cost of repairs and the replacement of grinding stones

1:Beals E-5 (1940-1941)1946 NU34 Tarasco NU34
Sierra Tarascans
[p.219a]
La Cañada

796 the streets with the musicians to the house of the čičiua, who serves nákatamales, *buñuelos*, and čápata, the men and women of the *cabildo* eating first. During the night there is much dancing of *jarabes*, first women dancing with
[text continues on top of p. 219b]

APPENDIX 3

## REPORT ON MAIZE

FROM CHERÁN By EDGAR ANDERSON
*Missouri Botanical Garden and Washington University, St Louis*

243 Fifty-five ears of maize were received from Dr. Ralph L. Beals, in lots numbered from 1 to 43, there being two ears each of most of the numbers above 30. The ears were photographed, grain samples were taken, and the ears returned to Dr. Beals. In the summer of 1942, 10 plants from each lot were grown at the Blandy Experimental Farm, of the University of Virginia,[20] Boyce, Va. Although the planting as a whole was badly infested with smut, at least one good tassel specimen was obtained from each lot and herbarium specimens were also made of leaves and seedlings. Notes on plant color, pubescence, etc., were taken in the field, and the internode pattern of one plant of each lot was recorded. Five plants from the entire lot were investigated in detail, cytologically, and the knob number and knob positions of their chromosomes were determined.

As a whole, the corn belongs to the race recently termed "Mexican Pyramidal" by Anderson and Cutler (1942). Many of the ears and the plants grown from them are indistinguishable (for all practical purposes) from collections made in the vicinity of Mexico City. However, there are certain average differences which seem to be significant, and a few of the numbers are unlike anything we have yet examined from Mexico, D. F. Plants are medium to tall, mostly with conspicuous sun red (occasionally purple) plant color. Tillers are few or absent. The leaves are broad but break easily in the wind, giving the collection a very bedraggled appearance, which is heightened by the susceptibility to smut. The tas-

[20] For laboratory space and many other courtesies, we are indebted to the Director, Dr. O. F. White.

[text continues on middle of p. 219b]

1:Beals E-5 (1940-1941)1946 NU34 Tarasco NU34
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Sierra Tarascans
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796 women and later men dancing with women. The latter enter into contests with others. *Pastores* are also sung all night, verses taken from printed pamphlets from Mexico. This is continued every night until Candelaria.

## APPENDIX 3
## REPORT ON MAIZE FROM CHERÁN

By EDGAR ANDERSON Missouri Botanical Garden and
*Washington University, St. Louis*

243 sels are large and coarse but there are few tassel branches. The ears are short, though the husks are often very long. The ear branches vary greatly in length, the most extreme being 3 or 4 feet long, with numerous secondary ears. This is partly due to culture in a region of different day length (i. e., Virginia vs. Mexico). The ears are prevailingly broad at the base, tapering sharply and evenly. The kernels are mostly hard and flinty but are nearly all more or less dented. There is great variation in kernel size and shape, not only from plant to plant but also on each ear, since, owing to the position of the husks, the grains at the tip of the ear are under strong compression, whereas those at the base have plenty of room. It is not unusual to see an ear with the basal kernels deeply dented but with no perceptible denting in any of the kernels at the tip.

Two main types were well represented in the collections (table 18). There were the so-called "Black" maize from Cherán (Nos. 31–37) and from Nahuatzen (Nos. 38–43) and "Tulukénio" (Nos. 1–26), a mountain type grown only above 8,500 feet (pl. 8). A third type, "Trimásion," is grown on the plain below 8,500 feet. It is said to be later maturing, larger-eared, and larger-grained. This was apparently confirmed by our collections, but since there were only two numbers (29 and 30) no averages have been prepared.

The collections of Black maize stood out sharply both in the field and in the collection of ears. The latter were around 15 cm. in length, nearly all of them with dark (blue or purple) kernels which were deeply to lightly dented and were rounded (i. e., not pointed). Purple cob

[text continues on p.221a]

243

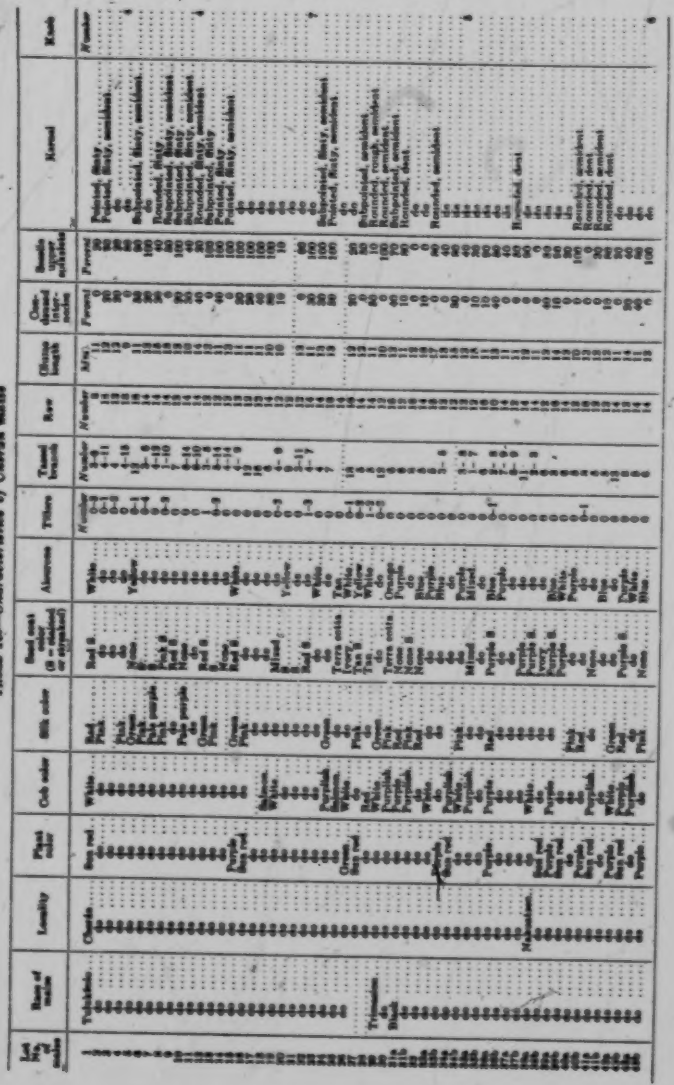

TABLE 18.—*Characteristics of Cherán maize*

[p. 220]

243 color was frequent, and many of the lighter cobs were flushed with purple or red. Many of the specimens belong to the color type called "cherry" by geneticists. In the field the purple plant color of a good many of the plants was conspicuous as well as the almost complete absence of tillers, which were frequent enough in the Tulukénio collections to produce a mass effect and make the field look thicker below row No. 30 than it was above that number. A summary of the records shows that on the average the plants of Black maize were taller, that their leaves were a little less pubescent, and that they averaged 5 instead of 7 tassel branches. The differences between Black maize from Cherán and from Nahuatzen were minor, the chief one being more color in the seed coat itself in addition to the prevailingly dark aleurone color. On the whole, the plants from Cherán were a little more variable and were about what might have been expected if varieties from Nahuatzen were grown in close proximity to other varieties from Cherán.

While the Black maize of Cherán and Nahuatzen is in general very similar to Mexican Pyramidal corn from around Mexico City, its broadish, rounded grains, its less condensed tassels, and its tendency to purple plant color are atypical for that region.

Much of the Tulukénio maize is quite like the corn from Mexico City. Nearly all the ears had more or less pointed kernels (characteristically with a dent behind the point) and those which did not have them produced plants with pointed kernels. While there was great variation, most of the varieties were small-grained (7 mm. wide or less). Unlike the Black varieties (whose endosperm was invariably white) about half had yellow endosperm. While the Tulukénio maize varied greatly in the color of the grains, it was prevailingly light and much of it had a rather streaky, irregularly developed pinkish purple in the seed coat. The colored portions were not sharply defined as in variegated maize, but gave rather the effect of a colorless ear which had been lightly brushed with some such dye as eosin. It is apparently due to allelomorphs of the 'P' series. While a few of the ears were straight-rowed, on the whole they were very irregular, at least on a portion of the cob.

1:Beals E-5 (1940-1941)1946 NU34 Tarasco NU34
[p.228 b]


243

Three of the Tulukénio collections (Nos. 1, 9, and 12, table 18) were of particular interest since they are unlike any corn from Mexico City which we have so far examined and since resemblances to them were apparent in several other collections (e. g. Nos. 16 and 17). They are small-cobbed, very flinty, with no trace of denting, and the cobs are cylindrical rather than tapering. That they are not merely poorly developed ears is proved by the fact that the plants grown from them were somewhat distinctive. They were short, one of them had more tillers than any other plant in the field, and their internode patterns revealed a strong tendency toward the Pima-Papago pattern rather than the Mexican Pyramidal pattern.

We do not yet have enough data about the kinds of maize to appraise the significance of these extreme variants of Tulukénio maize. It may be they are inferior types which have, through inbreeding, segregated out of better varieties. Since these mountain varieties are grown in isolated plots and since each family carefully preserves its own strain, this is quite likely. Even so, their morphology may be a significant throw-back to a type of corn once grown in this region, or in some region from which the Tarascan maize was derived. Since in most of their peculiarities they suggest Pima-Papago maize, which is known to be similar to the prehistoric Basket Maker maize (Anderson and Blanchard, 1942), it is possible that they are evidence of a primitive small-cobbed maize.

A cytological study was made of five different plants, by means of pachytene smears.

TABLE 19.—*Summary showing knob of each chromosome for 5 collections of maize from Cherán*

| Chromosome No. | Knob number in collections of— | | | | | |
|---|---|---|---|---|---|---|
| | Tulukénio maize | | | Black maize | | Average |
| | Be4. | Be11. | Be22. | Be34b. | Be43b. | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0 | 1 | 1 | S | 1 |
| 3 | 0 | 0 | 1 | 0 | 0 | 0 |
| 4 | 0 | 0 | 1 | S | 1+S | S |
| 5 | 0 | 1 | 1 | 0 | 0 | 0 |
| 6 | S | 0 | 0 | 0 | *0 | 0 |
| 7 | 1 | 1 | 1 | 1 | 1 | 1 |
| 8 | 1 | 1 | 1 | 1 | 1 | 1 |
| 9 | 0 | T | T | T | T0 | T |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 4 | 4 | 7 | 5 | 6 | 5 |
| Supernumerary ('B' chromosomes) | 0 | 1 | 1 | 0 | 0 | 0 |

S = Small knob.
T = Terminal knob.

1:Beals E-5 (1940-1941)1946 NU34 Tarasco NU34
[p.222a] Sierra Tarascans

243 Two of these plants had supernumerary or 'B' type chromosomes. The numbers and positions of the knobs on the 10 normal chromosomes are summarized in table 19. These facts will ultimately be significant when we have more data on knob numbers and positions from other types of maize (Mangelsdorf and Cameron, 1942). For the present we can say only that the knob numbers are intermediate between the high knob numbers of Western Mexico and the low numbers of the Mexico City–Toluca region.

The more significant measurements and observations made on the collection are summarized in table 18. Average values for the four most useful criteria of tassel morphology are shown graphically in figure 19, where they are compared with similar averages made on collections from pueblo-dwelling Indians in Arizona and New Mexico; from Pima, Papago,

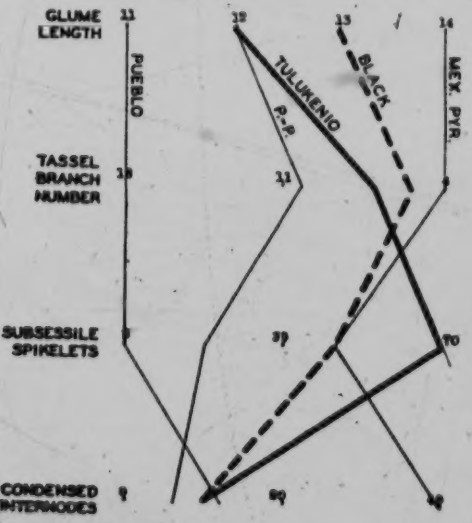


FIGURE 19.—Average values for four characters of the male inflorescence (the tassel) of Beals' collections of Tulukénio maize and Black maize. Narrow lines show averages of other collections for comparison: Mex. Pyr., Mexican Pyramidal from Mexico City; P.-P., Pima-Papago; Pueblo (Carter, Anderson, Cutler collections). The four scales used from top to bottom are glume length in millimeters, tassel branch number (values run from right to left for this scale), percentage of subsessile upper spikelets on tassel branches and percentage of condensed internodes on tassel branches.

1:Beals E-5 (1940-1941)1946 NU34 Tarasco NU34
[P.222b] Sierra Tarascans

243 and allied tribes; and from Mexican Pyramidal varieties collected near Mexico City.

It will be seen that insofar as their tassels are concerned both the Tulukénio varieties and the Black maize varieties are intermediate between the Mexican Pyramidal and the Pima-Papago. On tassel morphology alone they are even closer to the latter than to the former. Since, so far as we can tell from the ears, Pima-Papago maize is very similar to that of the prehistoric Basket Makers (Anderson and Blanchard, 1942), this strengthens the suggestion made above that one element in the ancestry of this Tarascan maize may have been a primitive small-cobbed race somewhat like that of the Basket Makers. A diagram based on ear and kernel morphology would also demonstrate that both of these Tarascan types are intermediate between Mexican Pyramidal and Pima-Papago, but it would not indicate as close a resemblance to the latter as is given by the tassel morphology alone.

## SUMMARY

The maize varieties from two adjacent Tarascan villages are described and their characteristics are recorded in detail. While as a whole they are more or less similar to collections of Mexican Pyramidal maize from Mexico, D. F., they can be divided into at least three subraces. For two of these, the "Tulukénio" and the "Black" maize, there is enough material to define the central core of their variation. Black maize is grown in gardens below 8,500 feet. Characteristically it has large, dark, smoothly dented kernels on a tapering ear about 15 cm. long. While it has certain technical resemblances to Pima-Papago maize (low percentage of condensed internodes in tassel, length of glume, etc.,) it differs only slightly from Mexican Pyramidal. Tulukénio varieties are grown above 8,500 feet in small isolated plots in the mountains. They are even more like Pima-Papago; their tassels technically are closer to the latter than to Mexican Pyramidal. They vary greatly in color, size and shape, the largest ears being about the size of Black maize. The kernels tend to be small, more or less pointed, semidented; their seed coats lightly stained or streaked with red. The extreme variants of Tulukénio are small-cobbed,

1:Beals E-5 (1940-1941)1946 NU34 Tarasco NU34
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[p.223a]

243 nontapering, early-seasoned, undented, and many-tillered varieties. They may possibly reflect a primitive small-cobbed race somewhat like the maize of the Basket Makers. If so, it was one element in the ancestry of Tarascan maize.

[text continues on top of p. 223b]

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[text continues on middle of p. 223b]

## GLOSSARY

104 The following list includes Spanish and Tarascan terms frequently used in the text. Words used only once or twice and defined at the time are not included in the glossary. Spanish words are given the local Tarascan usage, which is often different from either customary Mexican or standard Spanish usage. Tarascan words are followed by "T".

**Aćes** (T), the *cabildo*, or chiefs of the ceremonial organization.

**Agave**, a genus of plants, often called the *maguey*. In the United States, called the century plant.

**Agua miel**, the unfermented juice of the *agave*.

**Aguardiente**, normally a liquor distilled from sugarcane; in the Tarascan area, often called *charanda*.

**Almud**, a dry measure of about 0.8 of a liter.

[text continues on bottom of p. 223b]

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Taken in conjunction with Mangelsdorf and Cameron's recent (1942) analysis of knob number in Guatemalan maize, these results demonstrate the importance of considering altitude above sea level in interpreting the history and development of *Zea mays*.

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## GLOSSARY

104

**Arriero**, a muleteer.

**Arroba**, a measure of weight, slightly less than 25 pounds.

**Atapákua** (T), squash blossoms and immature squash cooked together.

**Atole**, a thin gruel, usually made of ground maize with various flavorings.

**Ayuntamiento**, the civil government of a *municipio*.

**Barranca**, a steep-sided canyon or gully.

**Barrio**, a ward or division of a town.

**Bilis**, a word used to cover a variety of sicknesses.

**Cabecera**, the largest town and administrative center of a *municipio*.

**Cabildo**, the group in charge of the ceremonial organization; the aćes.

**Calzones**, cotton trousers of unbleached muslin, worn by men for work and, by conservatives, for everyday wear.

1: Beals E-5 (1940-1941) 1946

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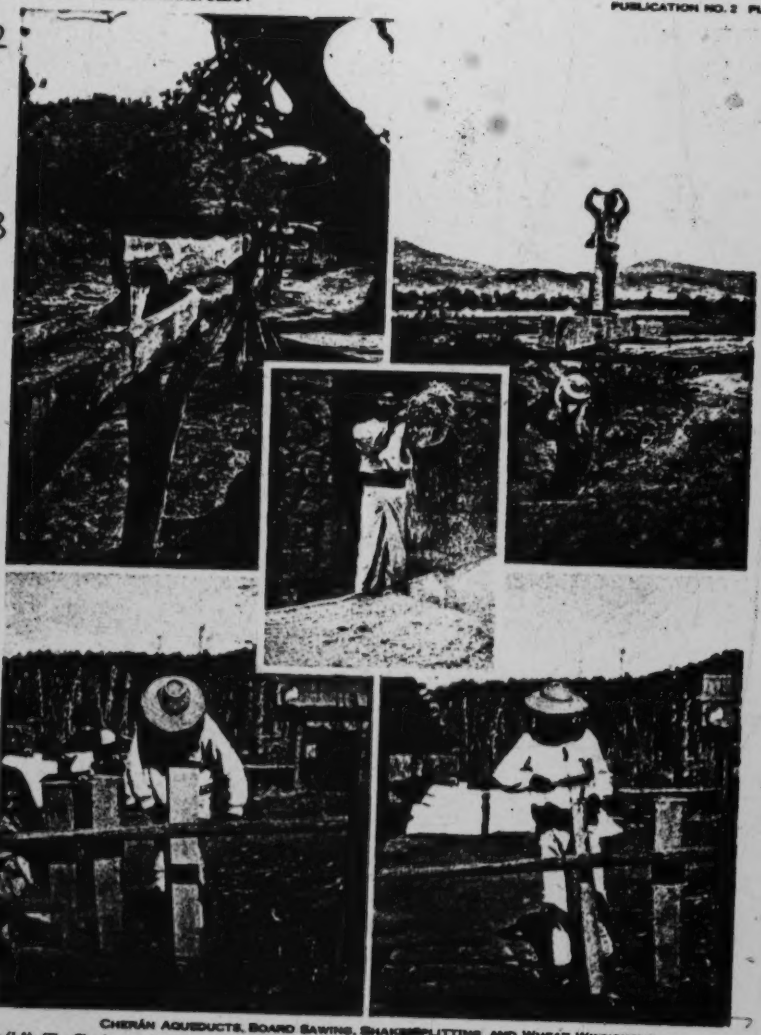

CHERÁN AQUEDUCTS, BOARD SAWING, SHAKESPLITTING, AND WHEAT WINNOWING.

*Upper (left):* The Cherán aqueducts, east of town. *Upper (right):* Sawing planks with sawpit. Often, the timber is raised on a pole framework instead of being placed over a pit. *Lower (left):* Splitting off a shake with a rajador. *Lower (right):* Starting to split a shake with a machete struck with a wooden mallet. *Center:* Cherán man winnowing wheat.

[End Plate 3]

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SPECIMENS OF MAIZE EARS.

Four specimen ears of Black maize (elote) and Tuhukínio (Ardm), representing extremes of size. Two of the Black ears are from Cherán, two from the neighboring village of Nahuatzen; all the Tuhukínio ears are from Cherán. Scale in center is approximately 4 cm. long.

[End Plate 8]

4: West K-5 (1946) 1948 NU34 Tarasco NU34
[p. 34-a]

241 177 The Tarascans, like many aboriginal groups strongly influenced by European culture, engage in two types of agriculture: field agriculture and horticulture. The former comprises extensive cultivation of grains in comparatively large fields with the plow and in small hillside plots with the hoe. Tarascan horticulture includes mainly the intensive cultivation of grains, vegetables, medicinal plants, and fruits in the house-lot gardens (ekuárhu, sing., ekuárheča, pl., hispanicized to *ecuaro*); it also includes specialized truck gardening, such as that practiced on the shores of Lake Pátzcuaro.

## FIELD AGRICULTURE AND ASSOCIATED CROPS

241 261 There are three basic native food crops of Mexico: maize (starch and oil), beans (protein), and squash (vegetable vitamin), all of which are now associated with field agriculture. In most Indian and many mestizo communities this complex forms the principal elements in the common diet; the three crops are planted together in the same field, cultivated together in the same manner, and harvested about the same time.

243 [172] **Maize culture.**—The earliest record of maize in the Tarascan area is found in the charred ears encountered in a lava flow 18 km. northwest of Morelia. The date of the flow is unknown, but maize was probably known to the Tarascans when they settled in the Sierra and the northern plateau.

The provenience of maize cultivated by the early Tarascans is but a small part of the complex and obscure movements of corn from a secondary center of origin in southern Mexico or northern Central America.[50] Anderson (1946 a) has described three distinct races of *Zea mays* in central Mexico: (1) the Mexican Pyramidal, centering in the eastern highlands; (2) Mexican Narrow Ear, found in western Mexico, particularly in both cold and hot lands of Jalisco and Nayarit; and (3) Mountain Yellow, a high altitude maize (usually above 7,000 ft.) encountered in purest form in the highlands of western Mexico.[51] Located between

[50] See Mangelsdorf and Cameron (1942) on the hybridization of South American primitive maize and *Tripsacum* in Middle America.

[51] Following is a brief description of the above races as given by Anderson (1946 a, p. 171): (1) Mexican Pyramidal. Ears short, tapering regularly butt to tip; row number high to very high (16-24). Kernels dented and pointed. Color prevailingly white and pale yellow. Plants short, pronounced intervaginal red or purple coloring. Shallow root system, leaves broad and pubescent. Tassels with few or no branches. (2) Mexican Narrow Ear. Ears narrow, long, irregularly long-tapered, compressed at butt. Low row num-

4: West K-5 (1946) 1948 NU34 Tarasco NU34
[P. 346]

243 the two centers of medium altitude maize (Mexican Pyramidal and Mexican Narrow Ear), the Tarascan area has received a mixture of both. Mountain Yellow, often diluted with strains of Pyramidal, is found in the higher mountain slopes in the Sierra. Other varieties, cultivated for special purposes (green corn, sweet corn) are also found in modern Tarascan agriculture. Popcorn, however, one of the oldest maizes in Mexico, is significantly absent.

*The field corns.*—Economically the most important maize modernly grown by Tarascans is the field varieties, cultivated usually in the level lands and on lower slopes. Morphologically, this maize is similar to Mexican Pyramidal, but with pronounced denting of the seeds, little or no pointing, and medium row number (14–18). In all probability this type represents a mixture of western and eastern corns, with characteristics of the latter being dominant. In the Sierra field corn is predominantly white and is grown *"de humedad,"* i. e. it is planted in the moist t'upúri soils in the dry season (March or April). For this reason it is called *blanco marceño*. In the lower areas surrounding the Sierra (e. g. the Lake district and La Cañada) field corn is morphologically similar to that of the Sierra, but is predominantly yellow and grown *"de temporal,"* i. e. planted in the clayey čaránda soils immediately after the first summer rains (late May or early June). The planting of a few grains of red maize (čóču) [194] with the field corns (both *humedad* and *temporal*) is a common practice in many Tarascan pueblos.[2] Many consider the red as "father" of all maize, and as a protector of field corn from disease, storms, and drought.

Traces of western low-row number in field maize are found scattered throughout the Sierra, where such corn is known as *maíz de ocho*, although the row count varies between 8 and 10. In many pueblos it was stated that *maíz de ocho* was grown more extensively in past years, especially by the

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ber (8-14). Kernels wide, unpointed, slight to no dent. Color prevailingly white. Plants tall, slender; slight to high intervalval coloring. Tassel with many branches, long and wiry. (3) Mountain Yellow. Ears and kernels small, somewhat compressed. Ears enlarged at base with irregular rowing there. Color bright yellow.

[2] This practice was encountered in the following Sierra towns: Cocucho, Nurio, Urapicho, Pomacuarán, Charán, Charanátzicurín, Pichátaro. In La Cañada: Tanaquillo, Carapan. The practice was denied in the Lake Pátzcuaro pueblos. In Nurio 1 grain of red is planted with 1,000 grains of white. Many former Tarascan towns (now mestizo) follow the customs: Tanaítaro, Ape, etc. The practice may extend far beyond the present bounds of Tarascan speech.

243 old people, but since the old ones have died, no one had continued its cultivation. This suggests that the western corn was formerly predominant in the area, which later was invaded by the eastern race.

243 177 Maize types are continually migrating from one pueblo to another within the Tarascan area and are also being introduced from the outside. For instance, *maíz de Sicuicho* has been grown in Arantepacua since 1889; *maíz de Chocandirán* (Nahuatl name for Tingüindín) is raised in Atapan; *maíz de Urúscato* in Tarecuato, etc. All such corns are morphologically alike, being differentiated chiefly by color. Again, in some Sierra pueblos farmers grow a corn called "toluca" or "tulukenio," presumably an introduction from the Valley of Toluca.[43] Around 1900 a maize called "chalco" from the Lake Chalco district in the Valley of Mexico was brought into the newly drained Zacapu Basin, where it now comprises the main corn of the surrounding Tarascan villages. Chalco is a modernly developed maize adapted to wet soils. In the Zacapu Basin it is grown "*de humedad*," and in recent years has been introduced into the Nahuatzen area.

243 *The mountain corns.*—On the steep slopes of the Sierra volcanoes the small Mountain Yellow maize is cultivated in little temporary clearings (*desmonte*, čapán, čapákata). This corn is obviously mixed with eastern field varieties, as in many cases the basal enlargement of the ear is not apparent and grain form varies from point to dent. Low row number (8–14), however, is invariably present. Color varies from yellow to white, often with pink present in the pericarp. Tolerant of light frosts and infertile soils and adapted to the ancient indigenous cultivation sites and practices, this maize may be one of the oldest in the area.

*The special corns: ékuárhu maize* (*Anderson 1946 a, 1946 b*).—One of the most interesting of the modern Tarascan corns is that cultivated in the house-lot gardens (*solar*, ekuárhu).[44] It is grown mainly for roasting ears (*elotes*). It is morphologically distinct from the field corns,

[43] According to Beals (1946, p. 22), the tulukenio found at Charán is a mountain type having definite characteristics of Mountain Yellow and grown in the slopes and mountain clearings. In other pueblos (e. g. Arantepacua) tulukenio is a field maize with Mexican Pyramidal characteristics.

[44] In the Sierra and the Lake region the term "ekuárhu" is used to mean house lot. In the mestizo towns and some Tarascan pueblos of the northern area, particularly La Cañada and west thereof, ekuárhu means small hillside cornfields, while the Spanish *solar* is used to designate house lot.

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243 having many characteristics of the Mexican Narrow: low to medium row number (10–16), usually long ears, slightly tapering from butt to tip, and slightly or nondented grains. In color it is the most striking maize of the Tarascans: blue, blue black, dull red, wine, and often white (from field corn) mixed with the above colors (*pinto*). In most villages of the Sierra the colored *elote* corns are rarely planted outside the house lot. When questioned as to the reason for this, informants invariably answered that such maize would not mature well in the fields, that it required soil of much greater "*fuerza*." [48] Possibly this corn has been grown so long in house lots, where refuse is thrown and animals stalled, that it has acquired a necessity for highly nitrogenous soils. The ekuáru maize is not limited to the Tarascan area, but is planted in a small way in many parts of western Mexico (Colima and Jalisco). Among the Huichol of Nayarit it has acquired ceremonial significance. Possibly developed from the Mexican Narrow Ear in the escarpment area of Jalisco and Nayarit, this maize spread westward into Michoacán; it is rarely found in the eastern part of the Mexican plateau (valleys of Toluca, Mexico, and Puebla). In the Lake district red is the dominant color of ekuáru maize; only few ears of blue or black are seen.

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*Sweet corn.*—This is rarely found among the Tarascans. In 1946 it was encountered in two towns, Teremendo and Chichota (mestizo). Because of its gummy consistency, sweet corn is never eaten green, but dried, mature grains are toasted to make *esquite*. The mature ears are called uačákata, for they resemble preserved green corn.

*Popcorns.*—The complete absence of popcorn in modern Tarascan agriculture poses a perplexing question concerning the antiquity of maize among these people. Popcorn is usually considered one of the most ancient of Mexican maizes (Anderson, 1946 a). The Tarascans were located between two popcorn centers—the western area (Jalisco, Nayarit) with its big-grained popcorns (*maíz reventador*) (Anderson, 1944) and the Toluca area with its small-grained *huilotlacaule* ("lo que comen las palomitas").

243 **Maize cultivation methods.**—Beals' (1946) description of maize cultivation in Cherán is typical

[48] In Urapicho the farmers believe that ekuáru maize is "afraid" of the fields and consequently will not grow there.

4: West K-5 (1946) 1948 NU34 Tarasco NU34
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243 for most of the Sierra. Here, therefore, only the major processes and regional differences will be highlighted.

*Ground preparation and planting.*—On the level basin floors and lower hill slopes, land is prepared for maize planting with the plow (*arado*). [412] [177] The ancient Egyptian two-piece affair drawn by a pair of oxen is the most common type of plow used by the Tarascans and by most of the present-day farmers of Mexico. (See Beals, 1946, p. 22, for illustration of this primitive plow.) Introduced into the Tarascan area in the 1520's or 1530's, this instrument was readily taken over by the native farmers. Adaptation to the plow was possibly slow in the Sierra, where most of the aboriginal agriculture was on steep slopes; but at least by 1624 the farmers of Cherán were cultivating the lower slopes near the town with the *arado* (AGN Tierras, vol. 83, exped. 13).

Prior to the introduction of the plow the flattish basin plains of the Sierra apparently were infrequently cultivated. Early accounts of Tarascan farming emphasize the importance of *desmonte* agriculture on the steep slopes. A report of 1599 describing the pueblo of Corundapan (now nonexistent) in the Sierra near Tingambato, states that the natives had no lands in adjacent basin plains, but, as was customary among Tarascan peoples, planted on the slopes in order to obviate frost hazard.[35] The probable occurrence of a grass sod in the basin plains may also have discouraged their cultivation. A description (1603) of the lands of Capacuaro mentions the large number of *desmontes*, but points out the possibility of cultivating an unused plain nearby, which was relatively free of shrubs and trees.[37] Such areas, though difficult to till with the aboriginal digging stick, were readily adapted to plow culture.

243 412 The plow now used in Tarasca probably has not changed in form since the early 16th century. For most plowing the straight iron plow tip (8 to 10 in. long, 3 in. wide), called the *reja*, is fastened

[35] AGN Tierras, vol. 84, exped. 2. ". . . no tienen tierras en los llanos y asi siembran en el monte como lo acostumbra toda la nación tarasca en lo que es tierra fria por abrigar sus sementeras de los yelos . . . ." This statement is from one of the field reports which accompanied recommendations for the village congregations at the end of the 16th century. Obviously, owing to air drainage, frost hazards are less on lower slopes than on the basin floor, a fact keenly recognized by modern Tarascan farmers.

[37] AGN Congregaciones, tt. 14v–15. Fray Diego Muñón describes the plain as " . . . llanada . . . la mayor parte rasa y descombrada, fertil y facil de labrar [with the plow, of course] . . . sujeta de mucha semilla y cosecha . . . "

243 to the lower point of the frame. This instrument
412 stirs, rather than turns, the soil to a depth of less than 6 inches. Within the last 50 years many Tarascans have used a small adaptation of the North European moldboard plowshare for breaking new land and for first and second plowings. For planting and cultivating maize the moldboard (which is slipped over the end of the plow frame) is replaced by the *reja*. As mentioned above, in recent years the Mexican government has supplied a number of American steel plows to various
243 Tarascan municipios.

[231] Oxen are used almost exclusively to pull the plow, to which they are hitched by the horn yoke. Mules and horses sometimes supplement oxen during maize cultivation, when the work must be done quickly. Before being planted, maize fields are plowed, this operation being called *barbecho*. In the Sierra the *humedad* maize lands in the plains are plowed twice, once in late summer and again in late winter. Temporal maize fields located outside the Sierra undergo only one plowing—in late May or early June, immediately before the rains. For planting, rows are formed with the plow equipped with the straight *reja*. Usually rows follow the contour on slopes. Two to three seeds are dropped at 1-foot intervals into the furrow by a boy following the plow and driver. Often the boy covers the seed with earth to a depth of 3 or 4 inches with a sweep of his foot. If animals are available, the first plow is followed by a second, which covers the grain by throwing earth from the interfurrow ridge (pl. 5). This plow is often equipped with a horizontal beam (*orejera*), placed back of the *reja*, which rakes earth into the furrow. Maize is normally cultivated (earth thrown toward the plant and weeds eradicated) twice with the plow, once when the plant is about 1½ feet high (*escarda*) and again when the plant begins to tassel (*segunda*). Thereafter, fields are weeded by hand or with the hoe.
[412] Zacatón (a form of Johnson grass) is cut with the *juda*, a machetelike sickle, similar to the *garabato* of the *tierra caliente*.[88]

412 Several forms of the pre-Columbian planting
243 stick are still used in the maize fields of the Sierra (fig. 3). These instruments, called meiánta-

[Text continues top of P. 38a - Analyst]

[104] [88] The Sierra Tarascans use many terms to describe maize in its various stages of growth. When the plant is about 4 inches high (2 weeks after planting), it is called pirán; at 1½ feet (ready for the *escarda*), kíni or tanéta; when in tassel, pigíta; when ears are in hair, tuxíni or tuxíjiti.

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tárakua,[59] are employed chiefly to replant maize which failed to germinate or was killed by frost. The most common form is a pointed, fire-hardened stick of oak or *otate*.[60] Occasionally the stick is tipped with a chisel-shaped iron piece. A less common type of planting stick, which carries a round wooden blade, 6 to 8 inches in diameter, is reminiscent of the ancient *coa*, from which it is probably derived. The blade and handle are ordinarily of oak and of one piece. In Capacuaro a meiántatárakua with a round metal blade attached to a wooden handle was seen.[61] Another wooden instrument, called *pala* or te'kátakua (sometimes simply tarákua), is used in the Sierra to plant maize in the house-lot gardens. The blade, carved of oak, is flat with an outline of the modern spade. In the wet lands of the Zacapu Basin Tarascans use this implement to plant maize in the fields.[62] There, blades purely of wood, of wood edged with metal, and wholly of metal were observed.

On the steep slopes and in small patches of soil within lava flows, where the plow is useless, the Tarascans have retained their ancient ways of soil preparation and planting. The hillside fields in the Sierra (*desmontes*) are cleared by cutting underbrush and small saplings with the *juás*, the larger trees with the ax (*hacha*), customarily during December and January. Girdling was not observed. In March the dried brush is burned, the wood ash serving as a much needed fertilizer for the leached yellow-brown soils (pl. 5). Such plots are usually productive for three to five consecutive plantings; thereafter they are abandoned for several years. A type of shifting agriculture is thus practiced on the steeply sloping lands. The small fertile plots within the lava flows, however, are permanent fields. Small permanent maize fields (*cachitos*, uatíui) also occur on lower slopes near the shore of Lake Pátzcuaro. Soil retaining walls at the lower edges of such fields give them

[59] Literally, instrument for replanting maize. The word "tárakua," meaning implement, or apparatus, forms the root of many Tarascan terms for various instruments used in the native economy.

[60] *Otáte* is a bamboo with tough, woody stalks.

[61] According to a native of Capacuaro, the present distribution of the round-bladed planting stick includes the towns of Capacuaro, San Lorenzo, Parancho, Quinceo, Arantepacua, Turicuaro, Cumachukín, and (before the volcano) San Juan Parangaricutiro, all located in the southeastern portion of the Sierra near the approaches to the *tierra caliente*. (Information supplied by Sr. Pablo Velásquez G.)

[62] The planter, following the plow, sinks the spade into the bottom of the furrow approximately 8 inches, shoves the instrument forward, prying up a section of earth, under which he casts the seed; he then extracts the spade, permitting the earth to fall back on the seed.

243 the appearance of terraces.[43] Remnants of pre-Columbian terrace agriculture occur in the vicinity of Chilchota in La Cañada.[44]

412 243 In the small plots described above, the large metal hoe (*azada, azadón*, with blade perpendicular to handle) is the principal instrument used to prepare the soil. Although called by the native name (t'ekáɬakua or tarákua) by some Tarascans, [177] the *azadón* is European, having been introduced into Tarascan culture early in the 16th century. The aboriginal t'ekáɬakua (with blade parallel to handle) is no longer used to prepare soil for planting, but, as mentioned above, is still sometimes employed to replant. In pre-Conquest times this instrument (at least in the *tierra caliente*) carried a copper alloy blade (Mus. Nac., leg. 102, Rel. de Cinguacingo, 1581); the tarákua with a triangular iron blade is at present employed by the mountain people in the Balsas drainage of Guerrero (Hendrichs, 1945–46, vol. 1, pp. 31–32).

Planting in the *desmontes* and other small maize plots is performed by opening a small hole with the *azadón*, dropping in the seeds, and covering them with earth by a sweep of the foot. The seed holes are spaced 2 to 3 feet apart, but no attempt is made to form straight rows. Maize is cultivated twice (*escarda* and *segunda*) with the *azadón*.

243 *Maize harvest and storage.*—Three maize products are obtained from the field: roasting ears (*elotes*), fodder (*rastrojo*), and mature ears (*mazorcas*, šanĺni). Roasting ears come mainly from the special colored corns of the house-lot garden, but many are taken from the fields. In the *humedad* lands of the Sierra *elote* is ready by August in the *temporal* lands, in July.[45] At high elevations (e. g. around the *rancho* of Cherato) the development of *elote* from corn planted in March

[43] These apparent terraces are best developed along the north and west shores of Tzin-k'éri Peninsula.

[44] The following account of the terrace agriculture near Chilchota is given in the Relación Geográfica for that town (1579):

" . . . *por ser muy pedregoso y de malpais las piedras estan puestas a manera como gradas dexando entre grada y grada con una cava de medir de ancho limpia donde plantaban el maiz, y es esto tanto y hecho por tal orden que parece cosa que pone espanto*" (Mus. Nac., leg. 103, f. 86v).

[45] In some Tarascan towns a minor celebration occurs when roasting ears begin to mature. The first ears picked in the village are taken through the streets by girls, who invite people to kiss the *elotes*. The ears are then taken to the village church and placed on the altar. Later, when all the fields and house lots are in *elote*, girls make special tamales (uléptu) of green corn for friends and the family. The *elote* fiesta is apparently a vestige of a significant aboriginal harvest rite. Other minor festivals occur on the first day of the fall-corn or spring-wheat harvests, but they are usually family days and consist mainly of a "cornbeer," or drinking spree. Often special foods—tamales, or ipu (meat stew)—are prepared. There are no religious rites involved in the latter fiestas. [196]

243 is often retarded until the following December or January.

246 251 Fodder, consisting of that part of the maize plant above the ears, is cut in September, when the plant is still green and the ears well formed. In the Sierra, fodder is often stored on platforms constructed in trees. Normally it is taken to the village and placed in sheds or on log platforms in the house lot (pl. 5).

243 Since the late fall maize harvest of Cherán, described by Beals (1946, pp. 24–25), is typical of most of modern Tarasca, no attempt will be made to repeat the data here. In only one area—the [493] Zacapu Basin—are four-wheeled wagons (*guallines* made of the frame and wheels of abandoned autos) used to haul maize from the fields to the [492] village. In all other areas burros haul the ears in sacks (*costales*) or nets. Ears of maize are 251 stored in the lofts of the main house; shelled corn is never stored. The ekuaru corn that is kept for seed and food is hung by the husks in bunches (*piña*, sandángata) or in rows over poles inside the house or on the veranda.

242 243 *Crop rotation and fallowing.*—Except in exceptionally fertile lands, field maize is rarely grown for two consecutive years on the same ground. In the basin plains of the Sierra, corn is often planted without fallow in spots refreshed by annual deposits of alluvium, as at the base of alluvial fans and in sink areas in the center of basins. The soils of the recently drained lacustrine plain of Zacapu are so rich that they support annual maize crops without rotation or application of fertilizer. Generally in the Sierra, maize fields in the basin plains and lower slopes are fallowed for 10 or 12 months every other year. In such fields only maize is planted. Usually during a given year, half of the plains land belonging to a village and a portion of the slopes are fallowed, the rest being planted; when the village possesses more than one basin plain, cultivation and fallow are alternated from one to the other. Ordinarily in the *desmontes* and *jollas* wheat or barley are rotated with maize (one year wheat, one year maize, one year fallow). In the temporal lands surrounding the Sierra customarily two crops per year, one of maize, the other of wheat or barley, are obtained from a given piece of ground. The land is then fallowed 8 to 12 months. (Wheat planted in November, harvested following April or May; maize planted in June, harvested in

242 November; land fallowed until following Novem-
243 ber.) Often fallow and planted fields are alternated between the slopes and the plains in the temporal lands.

*Fertilization in field agriculture.*—Tarascans make little or no attempt to apply fertilizer to maize fields. Occasionally animal manure (*estiércol*) from the stables in the house lots is spread over small parts of fields nearest the village.[46] Sheep and cattle, however, are turned into the fields after harvest, and shepherds are often paid to bed flocks in the fields. No commercial fertilizer is used, owing to its high cost. As mentioned above, new *desmontes* are fertilized by wood ash from freshly burned brush.

**Uses of Maize**—*Food.*—As in all indigenous
262 areas of Mexico, maize is the principal foodstuff
252 of the Tarascans. Six types of maize foods are common among modern Tarascans: (1) green corn, or roasting ears (*elote*, tiríapu); (2) toasted kernels ground to powder and mixed with sweetening (*pinole*, japúmata); (3) maize dough wrapped in maize leaves and boiled (*tamal*, k'uɹúnda); (4) maize gruel, or dough dissolved in water (*atole*, kamáta); (5) boiled maize kernels with shell removed (*pozole*, máskuta), similar to North American hominy; (6) thin cooked griddle cakes of maize dough (*tortilla*, ičúkuta), at present the most important single food item.

*Elote foods.*—Green corn is prepared by parching and by boiling. Without removing the inner husk, ears are often parched in the direct flames or under burning coals. Corn so prepared is called uirí́kan in the Sierra. Ears roasted with husks removed are termed "uirí́kata." Boiling with husks removed (jáman) is also common. Green ears are preserved by boiling and drying in the sun for many weeks. In the dried form they are called uačákata, and the consistency of fresh corn is revived by soaking and reboiling. Other types of maize foods are made from *elote:* a tamal (učópu) from early green maize; various atoles (atole de grano, atole de t'okéri, de uačákata, etc.); maize which is between the green and mature states (t'okéri) is often ground, shaped into small cakes, and boiled. The maize most frequently used for

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[46] In only one instance did the writer observe systematic application of manure. This was near the new Tarascan town of Caltzontzin, 6 km. east of Uruapan. In planting maize, the planter was followed by an individual who dropped a handful of manure over the seed. A plow followed, covering the seed and manure.

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252 *Squash foods.*—Both common squash and chilacayote are cut into pieces and boiled with the rind. Squash is often candied with piloncillo in mestizo towns nearby, but rarely in Indian communities. Squash blossoms (kukúmu, purú-ʧaʧáki) are boiled and eaten with salt and chile, and immature fruits are often stewed. Chilacayote, which has a watery, stringy flesh, is especially liked throughout the Tarascan area, and in the Sierra during the spring (when other vegetables are unavailable) it is eaten with an atole flavored with the nuríteni herb. In many pueblos the flesh is soaked in [273] water and permitted to ferment, forming a refreshing drink called *tepache.*[75] Finally, an atápakua, or stew of chilacayote, is often made by the Sierra Tarascans; the flesh is boiled with onion, silantro, and chile.

243 **Other native crops.**—Apart from the maize-bean-squash complex, a few other indigenous cultigens are found in modern Tarascan field agriculture. From the point of view of culture history, one of the most significant of these is amaranth (*Amaranthus cruentus*), which in most parts of Mexico is called *alegría* or *bledo* and in Tarascan, paní. The tiny (1 mm. diameter), round seeds, which occur in spikes at the head of the plant (1½–2½ meters tall), are rich in starch and oil. Sauer (1936) has suggested amaranth as one of the pre-maize cultigens of southern North America. Today it is cultivated in small amounts in many parts of central Mexico, usually in isolated Indian pueblos.

Among the modern Tarascans, especially those of the Sierra, three varieties of amaranth are grown: white, red, and black. Cultivation is usually limited to *t'upúri* soils of the highlands and to the house-lot gardens. It is planted both in plowland and in *desmontes*, but only in small patches within or at the edge of maize fields.[76] In the plowland the small grain is planted in *quemasones*. The log (usually oak) is burned in January and the seed planted in late May, immediately before the rains. The seed is also sown in freshly burned *desmontes*, but in the house lots ash fertilizer is rarely used. All three varieties

[75] Tepache is a general name for a number of drinks common to western Mexico, e. g. *tepache de piña, de ollacayote*, etc. To make *tepache de ollacayote*, the flesh of the squash is placed in an olla; water, piloncillo, and often soda water (carbonate) are added. Fermentation sets in immediately, and after 3 days the beverage is ready for consumption. After the first olla of *tepache* is consumed, more water, etc. is added to the flesh and the process repeated. The meat of one chilacayote is said to last 1 year of repeated fermentation.

[76] Fields of *alegría*, similar to those around Tulyehualco at the southern edge of the Valley of Mexico, are never seen in the present Tarascan area.

4: West K-5 (1946) 1948 NU34 Tarasco NU34
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243 are planted together, the seeds being separated according to color after the harvest. The plant is cut with a sickle in November or December, the grain threshed in an open space in the fields and stored in small ollas in the troje.

The cultivation of amaranth is disappearing among the Tarascans; it would probably die out rapidly if women did not constantly remind men to plant it every year. In some Sierra pueblos it [439] is no longer grown, but grain is brought in from other towns, particularly from Pamatácuaro and its surrounding ranches and from Capacuaro.[77] Little is grown in the Lake towns or in La Cañada, the grain being imported from the Sierra. In a few pueblos it was claimed that *alegría* was neither cultivated nor eaten: Paracho, Huánsito, San Jerónimo, Puácuaro, Napízaro.[78]

262 In terms of quantity consumed, amaranth has little importance in present Tarascan diet. Its significance lies in its relict position in Indian culture. Today the most widespread amaranth 252 food among the Tarascans is a tamal called "ƚ'apáta," made from a mixture of ground maize and *alegría*. Blue or black ekuáru maize is dry-ground on the metate; red or black *alegría* is then ground into the maize flour; a sweetening (piloncillo) and water are stirred into the mixed flour, and the resultant dough is wrapped in maize husks and boiled in an olla. In some pueblos of La Cañada ground *alegría* is mixed with wheat flour and piloncillo, of which tamales called ƚ'apátas de trigo are made. Moreover, *bolitas*, confections made of white amaranth, are made, but are more common in adjacent mestizo towns. The grain is toasted on the *comal*, then mixed with honey or a paste of piloncillo to make small cakes. These are commonly sold at fairs or on fiesta days.[79] Few ceremonial or religious uses of amaranth were found in the Tarascan pueblos.[80]

[77] Curiously, the Sierra pueblos which no longer cultivate *alegría*, but import grain for home use, are some of the more isolated, such as Urapicho, Coencho, Nurio, and Pomacuarán. In these towns no reason was given for not growing *alegría*. Possibly the inhabitants found it less bothersome to buy the grain than go to the trouble of raising it.

[78] Modern amaranth cultivation extends beyond the present limits of Tarascan speech in Michoacán. It is still grown and used in the former indigenous towns of Ape, Tanctiaro, Strahuán, Opopeo, and in some mestizo *ranchos* north of Uruapan.

[79] In Pamatácuaro an atole is made of amaranth and black maize. Such atole is widespread in the highlands of northern Guerrero (Hendrichs 1945–46, vol. 1, p. 35), and is probably encountered in other indigenous areas of Mexico. In Atapan a pakása (ground grain boiled in water to a solid mass) is made of red *alegría*.

[80] In Pamatácuaro atole of black *alegría* and black maize is taken especially at the maize planting celebrations. In Sicuicho ƚ'apátas are eaten at both the maize planting and harvesting fiestas. In other pueblos special uses of amaranth were denied.

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244 Tarascans plant few other minor native cultigens in the field. Camote or the sweetpotato (*Ipomoea batatas*) and jicama (*Pachyrrhizus erosus*) are planted in small amounts in La Cañada, but commercial production is found in the warm lands around Zamora, Lake Chapala, and the southern escarpment, outside the Tarascan area. Native vegetables such as chile and tomatoes are discussed under horticulture.

177 **Introduced New World crops.**—In Tarascan field agriculture these consist of two tubers: the 244 South American potato (*Solanum tuberosum*) and, as mentioned earlier, an *Oxalis* (*papa de Castilla*).[31] Neither has much place in Tarascan food habits. The potato is now grown in some lowlands bordering the Sierra, e. g. in Comanja, where it is planted with maize. Its cultivation is slowly penetrating the Sierra, though most of the highland pueblos still reject it. Beals (1946, p. 26) states that Cherán residents began to grow potatoes around 1938.

243 **Old World crops in Tarascan field agriculture.**— 177 Among the crops which the Spaniards introduced into Tarascan culture the small grains, wheat and barley, were the more significant in terms of both food value and degree of adaptation. Wheat was probably first sown in the Lake area by Spanish missionaries during the 1530's; the Spanish ranchers and *encomenderos*, however, for whom white bread was the main item of diet, were the principal carriers of wheat culture among the natives. By the mid-16th century Spanish wheat fields had been established in many parts of the northern plateau, and Tarascans of various pueblos in that area were cultivating the grain in special fields in order to meet tribute demands of the Crown and *encomenderos*.[32] Arabic irrigation [312] techniques appear to have been introduced jointly with wheat culture, for both early Spanish and Indian wheat fields in the northern Tarascan area were artificially watered.[33] The Relaciones Geo-

[31] The name "*papa de Castilla*" might indicate that the *Oxalis* species has been cultivated in Mexico for some time. According to local informants, however, it has been known in the area south and west of Lake Pátzcuaro for only 30 or 40 years. The tuber is often seen in the Pátzcuaro market. In Pichátaro it is boiled and eaten with piloncillo.

[32] The Suma de Visitas, ca. 1540 (Paso y Troncoso, 1905, vol. 1) mentions that wheat was cultivated in the following indigenous pueblos of Michoacán: Acámbaro, Chocándiro, Chiquimito, Chilchota, Guanaxo (Santa María Ario), Taymeo, Indaparapeo, Zacapu. Indians, however, were slow to adopt wheat foods. During the last quarter of the 16th century the Indians of La Cañada ate wheat only in times of maize famine (Mus. Nac. leg. 102, Rel. de Chilchota, 1579).

[33] Spaniards had introduced a Mediterranean grain adapted to winter rains and dry summers into a land of dry winters and wet summers. Con-

4: West K-5 (1946) 1948 NU34 Tarasco NU34
[P. 436]

243 gráficas of 1579–81 (Mus. Nac., leg. 102) indicate
177 that by the end of the 16th century wheat cultivation was well established in the Tarascan area around the margins of the Sierra, i. e., in those areas first settled by Spanish ranchers.[84] Wheat penetrated slowly into the conservative Sierra. The Relación of Tingüindín (1581) states that in the Sierra villages the Indians had not taken to wheat cultivation. Even by 1789 some of the Sierra pueblos did not grow wheat, but by 1820 the grain was at last being cultivated in all the towns, Urapicho, Cocucho, Pamatácuaro, and Cheranátzicurin being among the last to adopt it (AAM, siglo XIX, leg. 707, Memoria estadística, 1841).[85]

243 Today in most Sierra pueblos wheat is considered second only to maize in terms of acreage. Some towns raise the grain chiefly as a cash crop; others consume a large portion of the harvest. The Lake area and La Cañada, however, are the principal Tarascan wheat districts. In both, wheat acreage exceeds that of maize.[86] Although wheat foods are eaten in all Tarascan towns, in none do they replace maize as the chief item of diet. Throughout the present indigenous area
[177] wheat foods play a significant part in religious festivals, apparently an adoption of European customs through Church influence.

A soft wheat called "colorado," probably a descendant of the Spanish grain introduced 400 years ago, is the principal type sown by Tarascan farmers. Both bearded and beardless varieties occur. This wheat is the "*trigo de temporal*" or "*trigo aventurado*," planted in October and harvested from April to June, depending on eleva-

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[312] sequently, to insure good yields, they resorted at once to irrigation. Later, experiments probably showed that a poor to fair yield could be obtained without irrigation in central Mexico, where occasional light winter rains occur.

[84] The wheat-growing areas mentioned: all of the northern plateau region, including La Cañada; Tarecuato (trigo de temporal); Tingüindín; and Peribán. The Ponce Relacion (observations made in 1686) mentions wheat at various Lake towns: Tzintzuntzan, San Jerónimo, Erongaricuaro, and Tzumpato (Cocupao or present Quiroga).

[85] The Calderón report of 1789 (AGN Historia, vol. 73) mentions wheat only in a few Tarascan pueblos. It specifies, however, that only two pueblos (Ocumicho and Pamatácuaro) of the Sierra grew maize exclusively. The report may have neglected to indicate many pueblos in which small amounts of wheat might have been cultivated.

[86] According to data from Secretaría de Agricultura records (1944), wheat acreage equaled that of maize in the municipio of Pátzcuaro; in those of Erongaricuaro and Quiroga the acreage of wheat was more than twice that of maize; in Tzintzuntzan, however, maize acreage exceeded that of wheat by eight times. In the municipio of Chilchota (which includes La Cañada) approximately 500 hectares were planted to maize, while 313 were in wheat. Considering the valley of La Cañada alone, wheat acreage probably would exceed that of maize.

243 tion.[87] Owing to dry conditions and usually poor
[132] soils, yields are low. The infrequent light winter rains (*cabañuelas*) often determine the success or failure of the temporal crop. Another wheat type, a white soft variety, is called *"trigo de aguas"*; sown in June or July and reaped in November or December, it is seen in all parts
[312] of Tarasca. Most of the wheat crop of La Cañada is irrigated, being sown on the valley flats in December and harvested in May.[88] In the Sierra wheat is relegated to the less fertile slope land and *desmontes*, where it is rotated with maize. In the lake area and the northern plateau towns, where the grain is likewise a rotation crop, it is cultivated on both plains and slopes. It is occasionally sown in the house-lot gardens in all parts of Tarasca.

Primitive European methods are used in wheat cultivation (pl. 6). Land is prepared by plowing with oxen, and seed is sown broadcast and covered with a brush harrow. Grain is cut with the sickle (*hoz*), bundled and tied by hand, and threshed in the *era* (an open arena floored with stone or packed earth) located in the town or in the field. Threshing is accomplished by driving mules or burros over the bundles of wheat, but where sufficient animals are lacking, it is done by flailing. The grain is separated from straw and chaff with the tarákua, or wooden spade. All straw is carefully saved for animal feed. (Engine-powered separators are just beginning to appear in the area.)

252 One of the most interesting aspects of wheat
262 culture among the Tarascans is the varieties of food prepared from both metate-ground and milled flour. Those made from grain wet-ground on the metate include *tortillas de trigo*, a common food in La Cañada, but eaten on fiesta days (e. g. Corpus) in the Sierra towns.[89] In Charapan the tortillas are thin, round cakes often 1 to 1½ feet in diameter, which are cooked on the comal. Thicker tortillas, or *gordas*, are similarly made, but browned on the coals.[90] For the Corpus fiestas *gordas* (pirítis) ¾ to 1 inch thick and shaped like

[87] For example, most temporal wheat in the Lake region is harvested in early April, while in the Sierra ripening is retarded until May. In Cumachén, the highest pueblo in the Sierra, harvest occurs in the first weeks of June.

[88] The *tripales*, or wheatfields, are watered three times annually, at the end of January, first of March, and at the end of March. Pan irrigation technique is used.

[89] In the Lake towns of Ihuatzio and Janitzio metate-ground wheat dough is mixed with nixtamal (maize dough) to make a tortilla called ístakata.

[90] Beals (1946, p. 32) mentions that in Cherán *gordas de trigo* are fried in deep pork fat. This procedure was not encountered in other Tarascan towns.

252 262 animals (birds, rabbits, pigs) are made in some Sierra towns. In La Cañada, however, such figures are prepared from leavened wheat dough and baked in the oven.[91] Another wheat food, which is eaten particularly during and immediately after the wheat harvest, is called pakésa. Wheat grains are roasted on the comal, then dry-ground on the metate. The coarse flour is cooked in boiling water flavored with salt or piloncillo. The resultant dough is eaten hot or cold. Moreover, a wheat pozole (whole grains stewed with meat, chile, *tomate*, etc.) is prepared in the Lake and La Cañada areas, but rarely in the Sierra. Again, a wheat atole (trígukamáta) is found in all parts of Tarasca. Various types of bread, called *cemitas* or auákatas are also prepared from metate-ground wheat, usually by professional women bakers. The dough is often sweetened and the breads variously shaped (round or diamond). The dough is baked in the dome-shaped Spanish oven, several of which are found in every Tarascan village. Unsweetened ceremonial breads (kanákua), 1½ feet in diameter and 2 or more inches thick, are made on the Saint's day in some Sierra pueblos.

Wheat foods are also prepared from flour, milled in the larger mestizo towns nearby. A bread called kurínda is baked in the Spanish oven in most pueblos. In La Cañada and the Lake towns tamales (prepared like those of maize) and tortillas are made from wheat flour.[92] Buñuelos, a special dish prepared from wheat flour, are eaten ceremonially or as an occasional treat in all parts of Tarasca. The dough, mixed with tequisquite (a lime compound), salt, and boiled green tomatoes, is thinned into flat cakes by placing on the knee, patting and pulling at the edges. The sheets of dough are cooked in boiling lard in a *casuela*. In the Sierra both men and women prepare and cook *buñuelos*, which are eaten only on certain holidays. Often on ordinary occasions this food is soaked in a sirup of piloncillo and eaten with white atole in the Lake area.

*Barley cultivation.*—Small amounts of barley 243 are cultivated in most parts of Tarasca, but primarily in the Sierra, for animal feed. The grain is sown in June and harvested in November and

[91] Formerly in Charapan large phallic, shaped like human figures 2½ feet high, were given at weddings to the bride as a token of fertility.

[92] *Tamales de trigo* are also seen in the large markets (Uruapan, Paracho), where they are customarily taken with atole. In Paracho they are called *kasi-k.urínda* or *kurípit-ukári*.

243 December. Being more tolerant of poor soils and frost than either maize or wheat, it is customarily grown on the upper slopes. As it is believed that barley improves the soil, it is frequently rotated with maize. Much barley is sown on the high slopes around Cumachuén and Pichátaro, where yellow-brown soils and a short-growing season prevail. Oats are rarely cultivated; small fields were reported only in Pichátaro and Cumachuén.

244 *Other European field crops.*—Broadbeans, lentils, and chickpeas are cultivated chiefly around Lake Pátzcuaro and in the northern plateau pueblos, where they are often grown with maize. [262] Although small quantities are raised in the Sierra, these crops have little place in the native diet.

## HORTICULTURE

**The house-lot gardens (ekuárueča).**—These have been frequently mentioned above (pl. 7). In contrast to field agriculture, cultivation in the ekuáru is intensive; a large variety of plants (maize, beans, squash, vegetables, and fruits) are raised in each small lot; the soil is replenished by application of refuse from the dwelling and manure from the stable. The ekuáru is cultivated [462] mainly by the women and children of the household; the fields, in contrast, are worked by the men. In the gardens the women, always conservative, have retained the plants that are old in indigenous culture. Moreover, although some of the larger lots are plowed with oxen, most are cultivated with two of the present forms [412] of the tarákua: the wooden *pala* and the metal-bladed *asada*.

The principal garden crop is the *elote* maize, discussed above in connection with corn types. The cultivation of the old beans, such as kokóɣ, small patches of amaranth, and various squashes in the ekuáru, has also been mentioned. The women plant in the garden other indigenous vegetables, such as chayote (apúpu; *Sechium edule*),[26] *tomate* (tóma; *Physalis angulata*), which bears the small green husk-enclosed tomatoes; and, if water is available for irrigation, chiles of various types. The most significant vegetable grown in [262] the Tarascan house gardens, however, is the

[26] The chayote bears annually small squashlike fruits, which are boiled and served with chile. In its third year the plant develops a large tuberous root, which is dug up and boiled (uaxáa) and is often ground on the metate to a flour, which is served as a gruel (ugú). The plant is reproduced by seed, or rather by planting the entire chayote fruit.